

FIG. 1

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TEMPERATURE OF HEATING UNIT \ COMPONENT	N ₂ O	N ₂	O ₂	NO	NO ₂
1 0 0 0 °C	1	4 7	1 9	0 . 3	3 . 0
9 0 0 °C	8	4 0	1 7	0 . 2	2 . 0
7 5 0 °C	5 4	2 8	1 3	0 . 0 5	0 . 5

(%)

FIG. 2

	FILM THICKNESS	P e a k N VOLUME
EMBODIMENT	2 . 0 0 n m	2 . 2 4 a t o m i c %
COMPARATIVE EXAMPLE 1	3 . 3 6 n m	2 . 3 3 a t o m i c %
COMPARATIVE EXAMPLE 2	2 . 0 0 n m	0 . 8 7 a t o m i c %

FIG. 3

	T 1	T 2	T 3	T 4
EMBODIMENT	7 9 8 . 6	8 0 0 . 2	8 0 0 . 1	8 0 2 . 6
COMPARATIVE EXAMPLE 3	7 9 8 . 4	8 0 0 . 1	7 9 9 . 9	8 0 1 . 8

(°C)

FIG. 4

FIG. 2

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PROCESSING CONDITION	TEMPERATURE OF REACTION TUBE	7 5 0 °C	8 0 0 °C	8 5 0 °C
HEATING UNIT 900 °C REACTION TIME 15 MIN	THICKNESS INCREMENT	0 . 2 9	0 . 5 0	0 . 9 0
	PEAK N VOLUME	0 . 5 5	1 . 0 5	1 . 5 3
HEATING UNIT 1000 °C REACTION TIME 15 MIN	THICKNESS INCREMENT	0 . 2 8	0 . 4 7	0 . 8 8
	PEAK N VOLUME	1 . 1 3	1 . 2 4	1 . 6 6
HEATING UNIT 1000 °C REACTION TIME 30 MIN	THICKNESS INCREMENT	0 . 3 6	0 . 7 5	1 . 0 9
	PEAK N VOLUME	0 . 7 8	1 . 7 2	1 . 8 3
HEATING UNIT NOT HEATED REACTION TIME 15 MIN	THICKNESS INCREMENT	0 . 3 0	0 . 5 4	1 . 0 1
	PEAK N VOLUME	0 . 2 1	0 . 3 6	0 . 5 2

(THICKNESS INCREMENT : nm, PEAK N VOLUME : atomic %)

FIG. 5

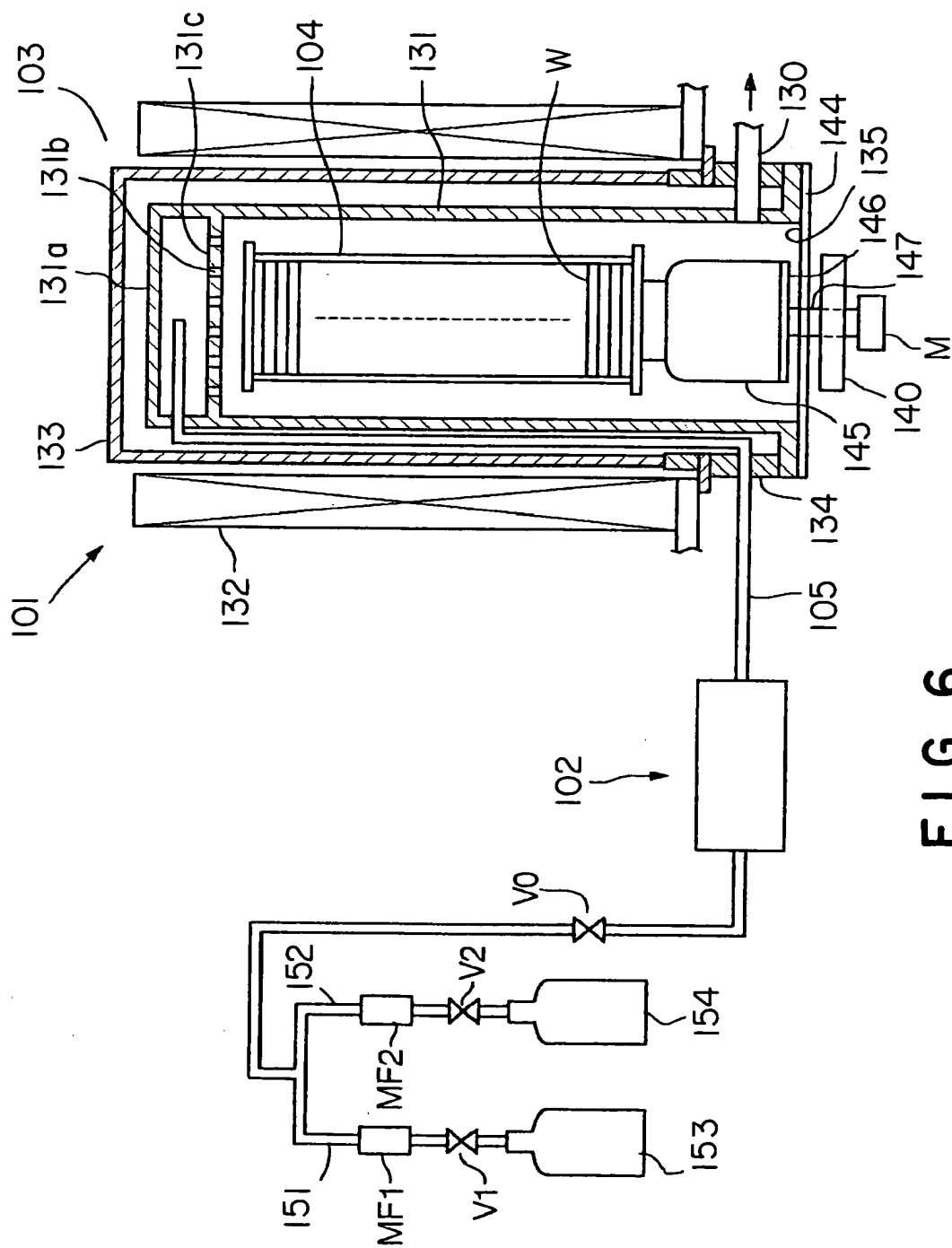


FIG. 6

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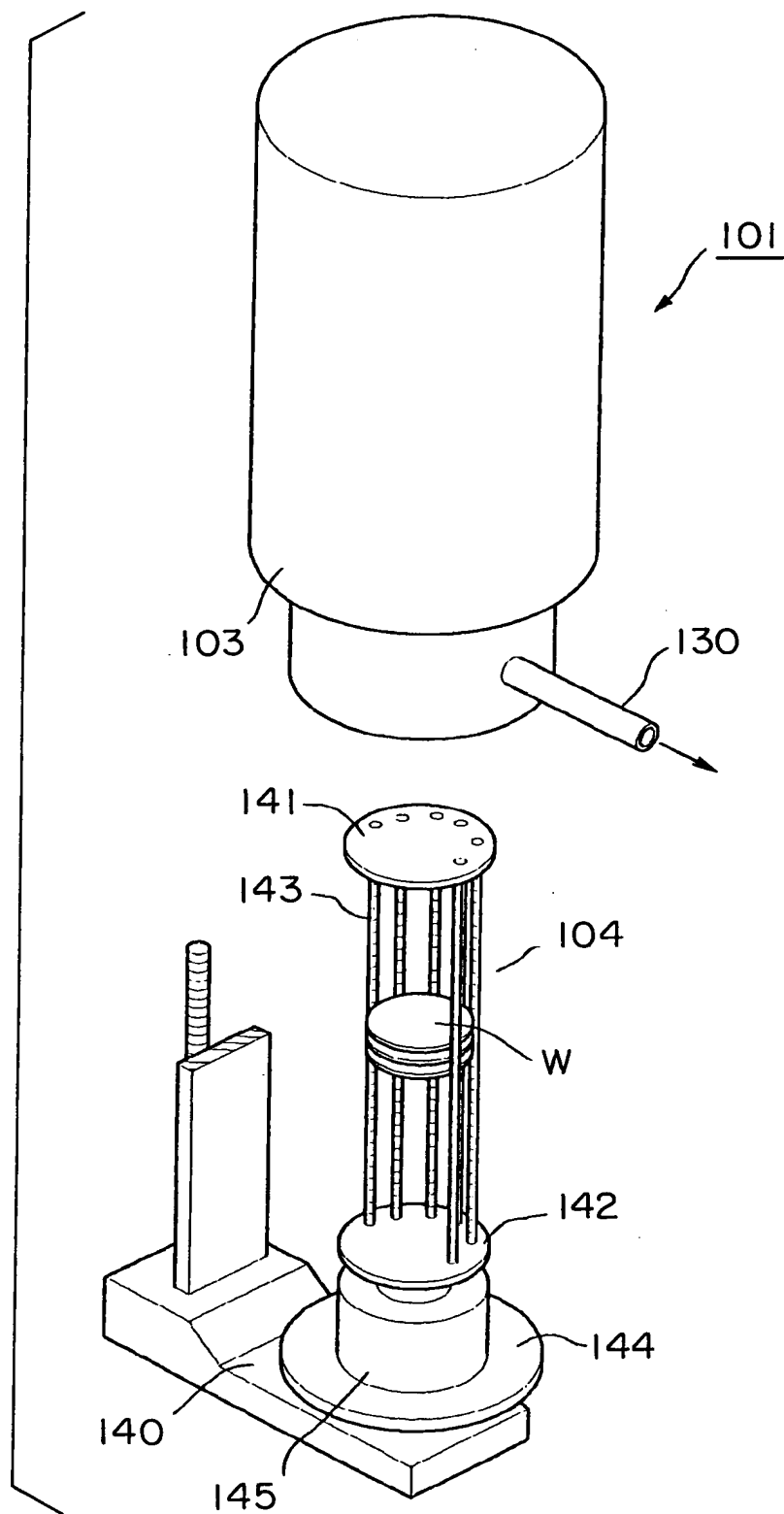


FIG. 7

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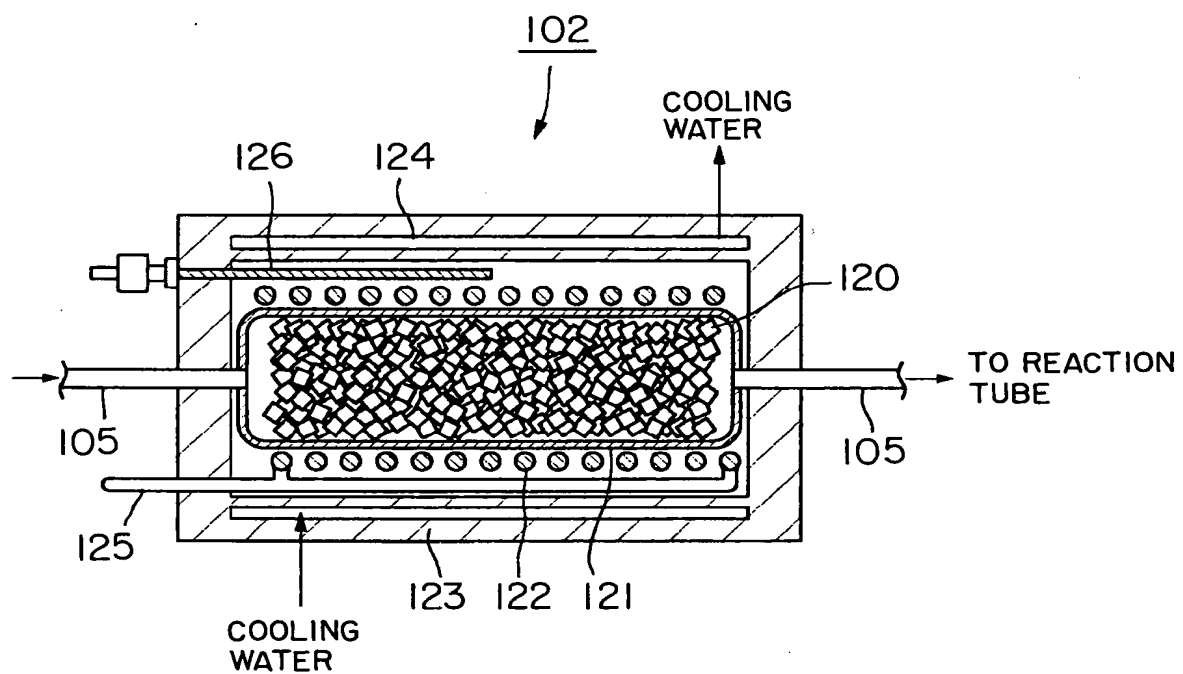


FIG. 8

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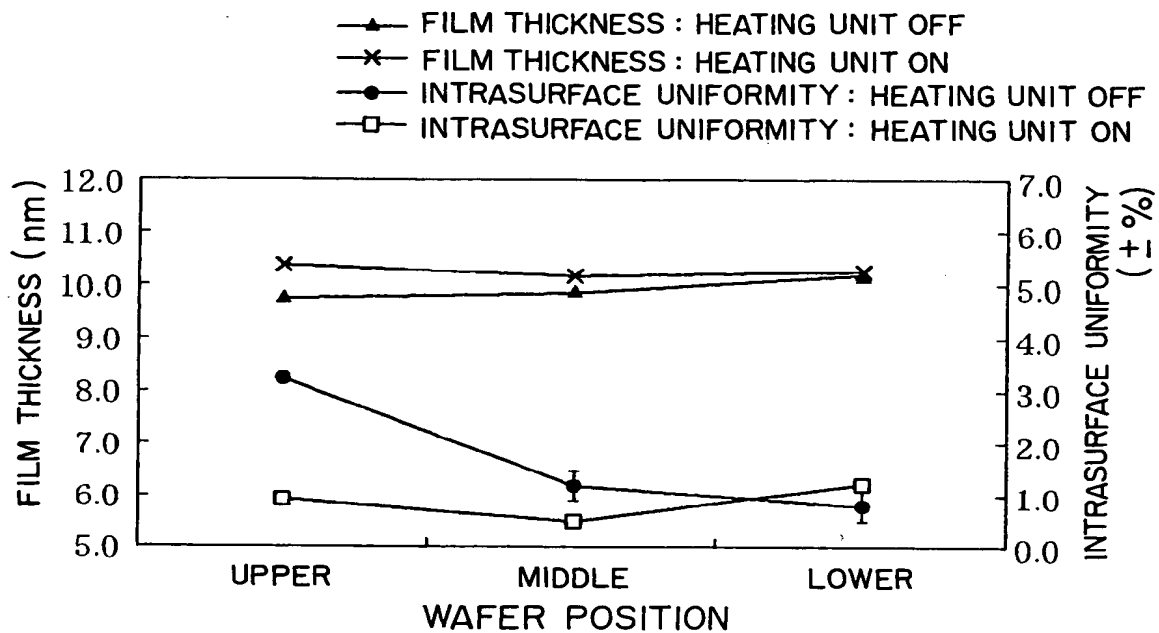


FIG. 9

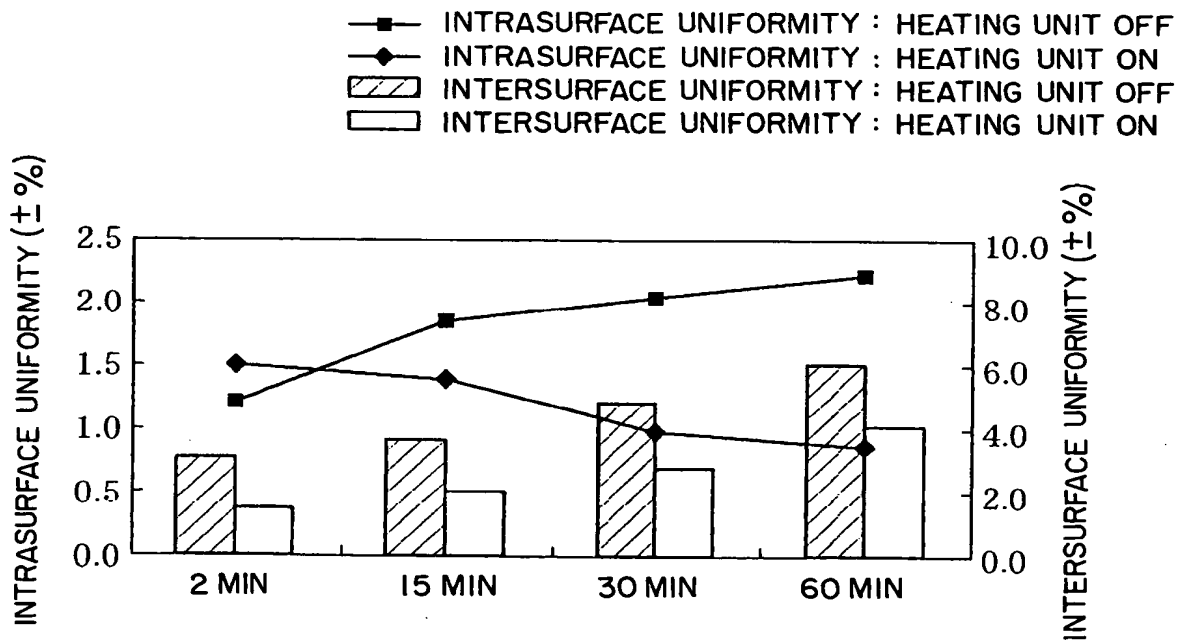


FIG. 10

Test No.	HEATING UNIT	ANALYSIS STARTING TIME (min)	H ₂ DENSITY (ppm)
①	ON	30	<5
②		50	<5
③	OFF	30	23
④		50	78
⑤		70	24

FIG. 11

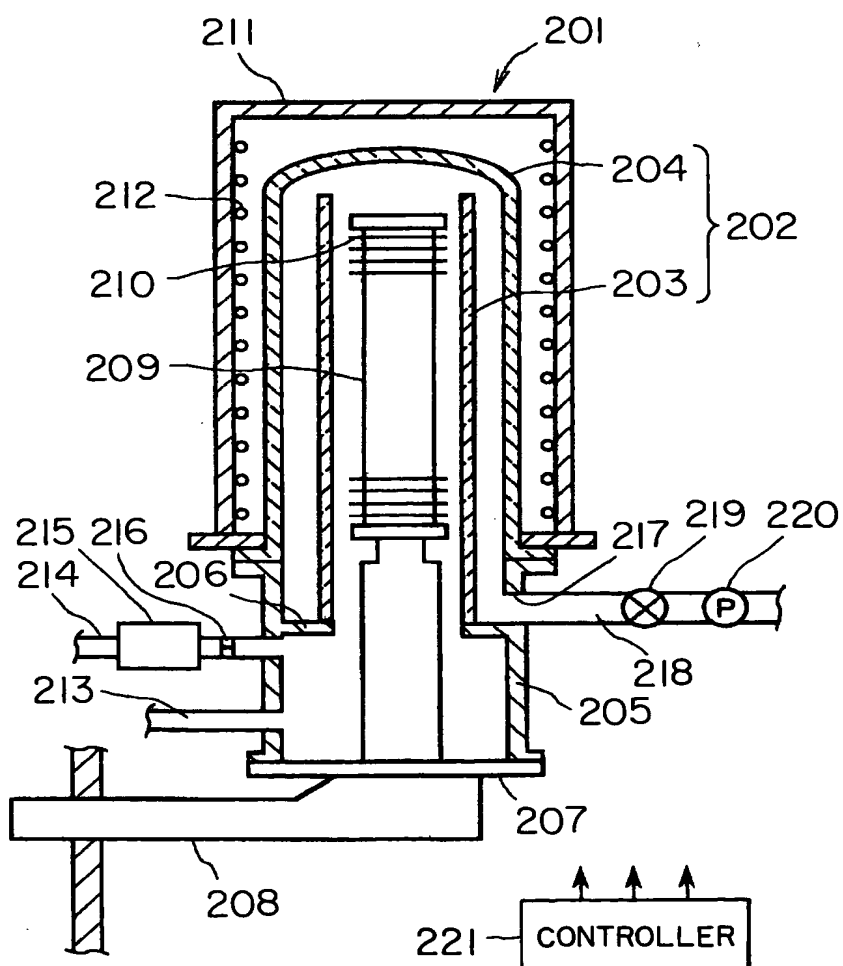


FIG. 12

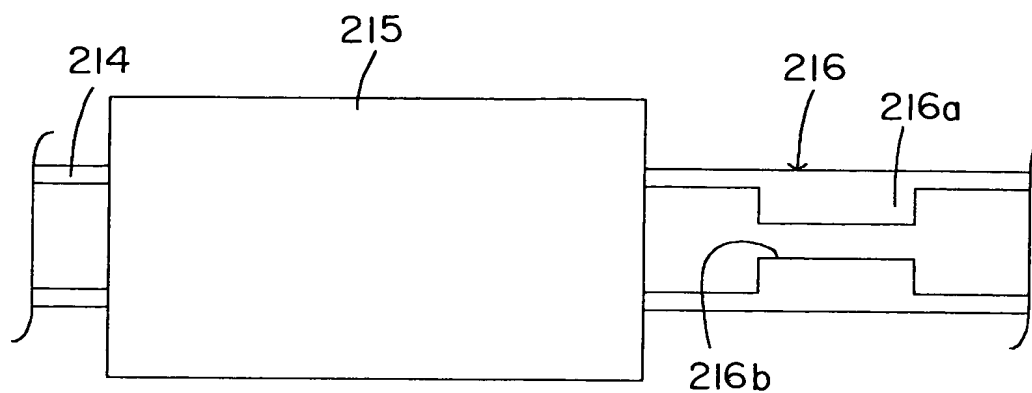


FIG. 13

	TEMPERATURE OF REACTION TUBE	D/R	R I
EMBODIMENT	550 °C	0.70 nm/min	2.0
COMPARATIVE EXAMPLE	550 °C	0.27 nm/min	2.9

FIG. 14

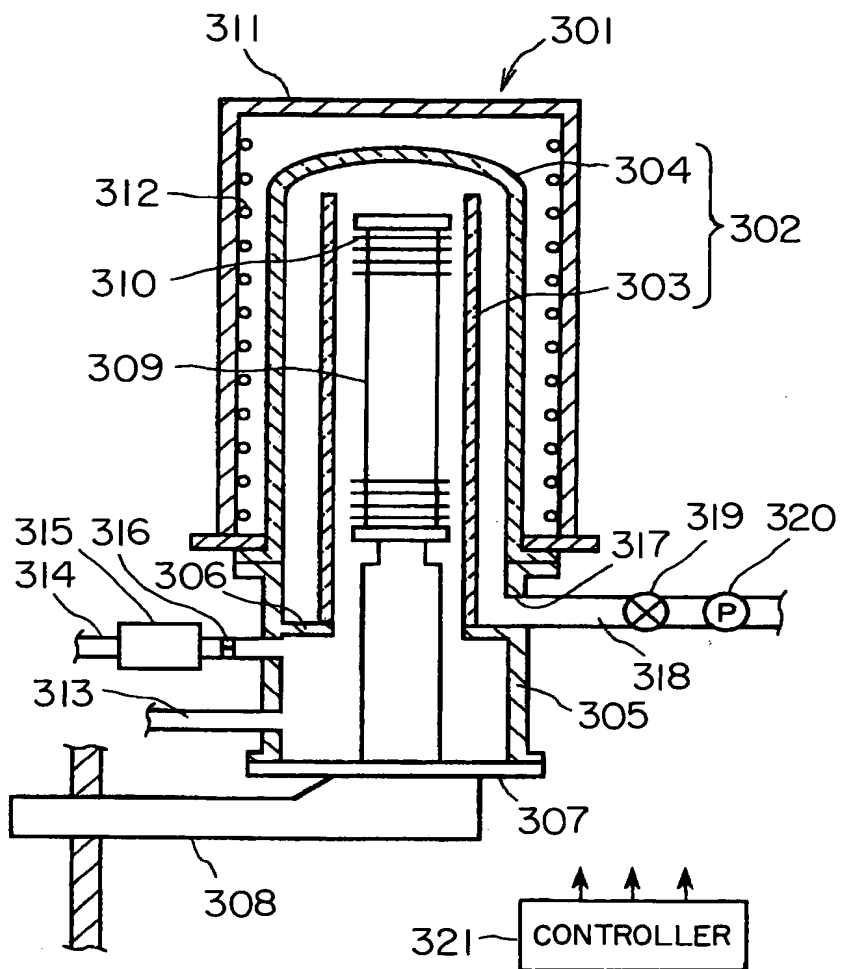


FIG. 15

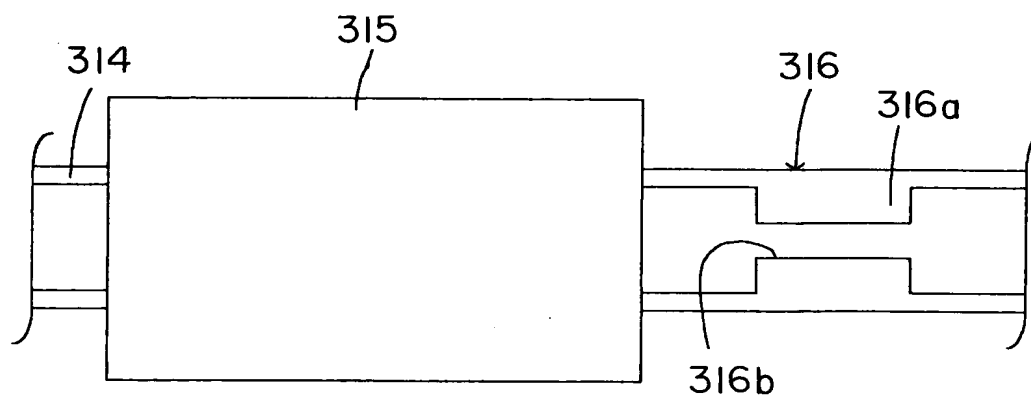


FIG. 16

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TEMPERATURE OF HEATING UNIT	OXYGEN CONCENTRATION
6 0 0 °C	5 %
7 0 0 °C	1 1 %
7 5 0 °C	1 3 %
8 0 0 °C	1 4 %
9 0 0 °C	1 7 %
9 5 0 °C	1 9 %
1 0 0 0 °C	1 9 %

FIG. 17

TEMPERATURE OF HEATING UNIT	FILM FORMING RATE
NOT HEATED	0. 0 7 nm / m i n
5 0 0 °C	0. 0 7 nm / m i n
6 0 0 °C	0. 0 8 nm / m i n
7 0 0 °C	0. 1 4 nm / m i n
7 5 0 °C	0. 2 7 nm / m i n
8 0 0 °C	0. 4 8 nm / m i n
9 0 0 °C	0. 7 2 nm / m i n
9 5 0 °C	0. 7 8 nm / m i n
1 0 0 0 °C	0. 7 8 nm / m i n

FIG. 18

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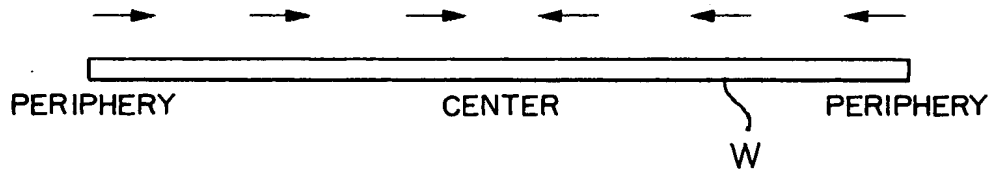


FIG. 19A

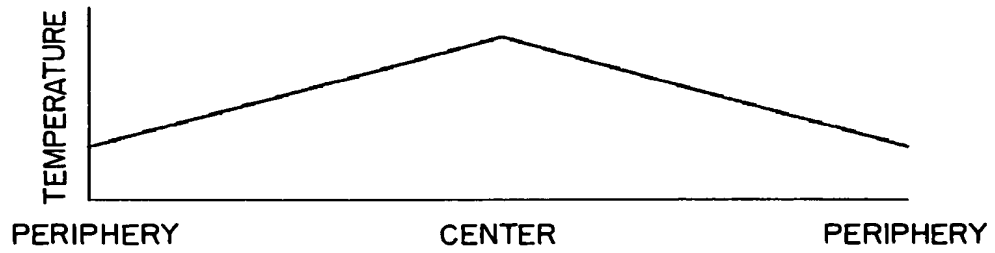


FIG. 19B

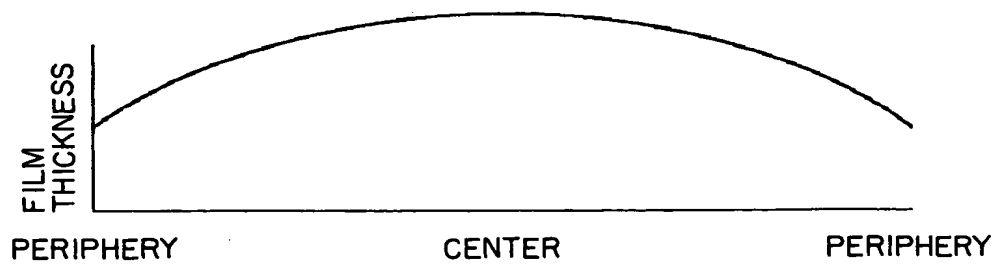


FIG. 19C

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